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ABSTRACT

This study investigated the degree of variation in the willingness to make inferences based on little information, the variation in accuracy of such inferences, and the relationship between willingness and accuracy of inferences and the race and social class of the subjects. The subjects were 140 fifth graders from six public schools in Atlanta, three of which were labeled "disadvantaged." An incomplete pictures test was administered individually to each child. The picture "grew" from a few scattered lines to completion. The task was to identify the picture as early in the sequence as possible. The findings were as follows: (1) subjects demonstrated a marked unwillingness to make inferences from little information; (2) willingness to make inferences was significantly greater among blacks than whites; it was also greater among disadvantaged than advantaged subjects, but the difference was not significant; and (3) the propensity to reach accurate conclusions under conditions of information deprivation was mathematically greater among black subjects than white subjects and among advantaged subjects than disadvantaged subjects, but none of the differences were statistically significant. (RSM/Author)

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A STUDY OF
INTUITION AS INFERENCE

by

Ralph C. Frick

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ABSTRACT

The problem in this study was threefold: (1) To investigate the degree of variation in the willingness to make inferences based on little information; (2) to investigate the variation in accuracy of such inferences; (3) to investigate a possible relationship between willingness and accuracy of inferences and the race and social class of the subject.

The subjects were 140 fifth graders from six public schools in Atlanta. Three of these schools were labeled "disadvantaged." The criterion for this label was eligibility for Title I funds through ESEA, which meant that a minimum of 60% of the families represented in these schools had an annual income under $3000.

An incomplete pictures test was administered to each subject individually. The test consisted of a series of twelve pictures, each containing eight clues. The picture "grew" from a few scattered lines on the first clue to completion on the eighth clue. The subject, permitted as many attempts and as much time as he liked, was shown the clues sequentially, and the task was to identify the picture as early in the sequence as possible.

The two scores thus derived were the total number of attempts made to identify each picture, summed over all twelve, and the number of clues required by each subject to correctly identify each picture. Since the pictures

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varied in difficulty, each subject's "clues to solution" score was compared with the group mean for that picture. The number of pictures on which a subject scored at or above the group mean was labeled his "Right" score. A low Right score indicated that the subject had been successful in identifying pictures on the basis of little information.

The "Attempts" scores and the "Right" scores were analyzed and plotted on a graph. Two-way analysis of variance tables were used to determine the possible existence of a relationship among race, socioeconomic status, willingness to make inferences, and accuracy of inferences.

Conclusions of the study:

1. Subjects demonstrated a marked unwillingness to make inferences from little information.

2. Propensity for intuitive thinking as measured by accuracy of inferences from little information appeared to be fairly normally distributed.

3. Willingness to make inferences from little information was significantly greater among black subjects than white subjects; it was also greater among disadvantaged than advantaged subjects, but the difference was not significant.

4. The propensity to reach accurate conclusions under conditions of information deprivation was mathematically greater among black subjects than white subjects and among advantaged subjects than disadvantaged subjects, but none of the differences were statistically significant.

ATLANTA UNIVERSITY

SCHOOL OF EDUCATION

A STUDY OF INTUITION AS INFERENCE

BY

RALPH C. FRICK

ATLANTA, GEORGIA

AUGUST, 1970

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CHAPTER I

THE PROBLEM

Introduction. The most common element in the various definitions of intuition is an ability or propensity to make maximum use of minimum information. This includes the discussion of intuition from ancient philosophers, who speculated on its extrasensory character, to modern psychologists, whose experiments have yielded little information, but who feel that intuition must have some useful function.

For many years intuition was studied and discussed from a philosophical point of view. Most of the conceptualizations summarized by Wild(1) refer to this kind of intuition. Recently psychologists have attempted to deal with intuition in behavioral terms. Allport(2), while not defining intuition, nevertheless distinguished between the use of intuitive and intellectual knowledge as a method of reaching a conclusion. Berne(3) defined intuition as perceptive processes above and below the level of consciousness. Hathaway(4) said that intuition becomes involved when the evidence appears to be inadequate to produce the resulting inferences drawn. Still another approach is to emphasize the use of intuitive thinking as an important cognitive operation in the problem solving process(5,6,7).

A recent comprehensive study of intuition has been conducted by Westcott(8). He points out the historical distinction between "philosophical intuition" and "psychological intuition," the latter being distinguished from the former by its reliance on sense data for information and the verifiability of its conclusions. Psychological intuition is thus also distinguished from extrasensory perception which, although its conclusions are verifiable, does not rely on the senses for information. Westcott's investigation has led him to define intuition as "reaching a conclusion on the basis of less explicit information than is ordinarily required to reach that conclusion(8, p. 9).

In general, few writers go beyond an almost wistful contemplation of this mysterious trait and what potentially dramatic properties it may have. The few attempts to seek it out, to define and measure it, have up to this time met with only moderate success.

Statement of the problem. The problem in this study is (1) to investigate the degree of variation in the willingness to make inferences based on little information; (2) to investigate the variation in accuracy of such inferences; (3) to investigate a possible relationship between willingness and accuracy of inferences and the race and social class of the subject. These problems will be studied on the basis of the following hypotheses:

1. That willingness to make inferences based on little information is a variable distributed in the form of a curve positively skewed in the direction of more frequent attempts.

2. That accuracy of inferences based on little information is a variable distributed in the form of a symmetrical curve.

3. That willingness to make inferences based on little information is a variable found more frequently among

(a) black subjects than white subjedts.

(b) lower class subjects than higher class subjects.

4. That the propensity to carry on intuitive thinking is a variable found more frequently among

(a) black subjects than white subjects.

(b) lower class subjects than higher class subjects.

The investigation will be conducted by using an incomplete pictures test. This scale, drawn on 5" x 8" white cards, consists of a set of eight fragmented drawings of the same object. Each drawing after the first is more complete than the one before it. These drawings, referred to as clues, are presented to the subject sequentially, and the task is to correctly identify the object as early in the sequence as possible. Only the multiple-response method of administration will be used; hence there will be no limit on the number of attempts made by the subject to identify the object.

Limitation. Classifying subjects according to socioeconomic status is a difficult undertaking. It is a less rigorous procedure to identify an entire school as representing a given socioeconomic level than to so label each subject. Investigating the variable of socioeconomic status on the basis of schools rather than individuals is a limitation of the present study. To label a certain school as being advantaged or disadvantaged is not to imply that every pupil has the same socioeconomic position. However, most schools reflect a community in which the majority of members are quite similar in economic and social standing. In this study, a disadvantaged school is defined as one that is eligible for funds through Title I of the ESEA. This means that a minimum of sixty per cent of the parents have an annual income below $3000. Schools in the study not eligible for Title I funds are labeled advantaged.

Definition of terms. In this study, Intuition is defined as the propensity to reach a conclusion on the basis of less information than is ordinarily required to reach that conclusion. Such propensity will be determined in terms of the number of clues needed by a subject to correctly identify a picture in relation to the mean for all subjects on that picture. This procedure is explained in Chapter IV.

Willingness will be determined by the total number of attempts a subject makes to identify all the pictures.

CHAPTER II

REVIEW OF THE LITERATURE

Intuition as some kind of intellectual process operating on the basis of sensory input was the object of considerable speculation in the early part of the twentieth century, with a suspected significance for problem solving gradually emerging. Bouthilet(9) attempted to measure intuition in a problem solving setting. Her review of the literature provided little direction for an attempt at defining intuition. The studies she investigated were mostly studies on concept formation and trial-and-error learning. She eventually conducted her study without an operational definition of intuition.

Bouthilet constructed a list of paired words, the second word being composed of letters present in the first word. These pairs were presented to a group of young adults at two-second intervals. Then each subject was given a new list of words for which he had to choose the correct associate from a group of four. This process was repeated until all subjects grasped the concept or until the lists were exhausted. Those subjects who got more than chance answers correct before concept formation were considered intuitive. As a result of her study, Bouthilet felt constrained to include in her discussion

a definition of intuition as "the capacity to make correct guesses without knowing why." (9, p. 57)

By the late 1950's and early 1960's there appeared a resurgence of speculation on the role of intuition in the problem solving process. Taylor, et al.(10) emphasized the need for improving the education of individuals for research in psychology. This kind of education must develop individuals who not only are willing to break the rules, but also know when and how to break them. The use of intuition is important for this kind of researcher.

Bruner(6) considered intuition important enough to devote a substantial section to it in his summary of the Woods Hole Conference. He took it as a phenomenon which exists, which has potential for constructive use, and ought, therefore, to be dealt with as advantageously as possible.

Bruner and Clinchy(11) described various features of intuition as a first step in analytic procedures for problem solving, reaching conclusions on the basis of insufficient evidence, and going beyond the information given. They stressed the need for exploiting the possibilities of intuition for use in school situations.

Clinchy(12) essayed to delineate the role of intuition in the learning situation. She began with the definition of intuition as the condition when "we know something

without knowing how we came to know it and without being able to prove it(12, p. 33). Her subsequent discussion dwelt on setting the conditions for intuition to operate, and thereby she pointed up one of the hazards of attempting to define intuition. She emphasized the necessity of encouraging guesses, even though they may be inaccurate, and eventually concluded that "intuitions are often wrong" (12, p. 36). The question then becomes, are there successful and unsuccessful intuitive thinkers or only intuitive and non-intuitive thinkers? Clinchy concluded that we must "deepen and discipline children's intuitive powers"(12, p. 37).

Westcott's study of intuition led him to a working definition of intuition as " reaching a conclusion on the basis of less explicit information than is ordinarily required to reach that conclusion"(8, p. 98). Eleven samples of college students served as subjects for a series of problem solving experiments of four types: verbal analogy problems, verbal series problems, numerical analogy problems, and numerical series problems.(8, pp. 100-148).

Each problem consisted of a set of clues in the form of seals that covered a symbol, either verbal or mathematical. Only one solution was possible for each set of clues. The subject removed the seals one at a time in proper order and wrote down the solution to the problem as soon as he knew it. The directions included reminders

to use as few clues as possible. In recording his answer, each subject also recorded on a four-point scale the confidence he had in the answer he had selected.

The total number of clues exposed for the twenty problems yielded an Information Demand score. The total number of solutions was called the Success score. The ratio of Information Demand to Success was designated as the Efficiency score, and Confidence was simply the total or mean rating on the confidence scale.

Results indicated that subjects differed in amount of information required before attempting a solution and in the number of corredt solutions reached. Since these two dimensions of each subject's behavior were independent of each other, it was possible, through various combinations of these characteristics, to distinguish four kinds of behavior. The behavior that combined little information with much success met the criteria for intuitive thinking. Additional studies failed to reveal any conclusive patterns with respect to academic or personality variables that might correlate with intuitive thinking.

A second series of studies by Westcott(8, pp. 149-177) explored intuitive thinking by measuring performance on a kind of incomplete pictures test which Westcott labeled a Perceptual Inference Scale. An object was traced in varying degrees of completion on a series of white cards. Each

card repeated the lines of the previous card and added a few more until the last card represented the completed drawing. These cards were presented to the subject in proper sequence, and the subject attempted to identify the object as early as possible. Various forms of the scale had different numbers of sets of drawings. The subjects were children and young people ranging in age from nursery school to college.

Results showed that performance on the Perceptual Inference Scale was somewhat related to age, with nursery children exhibiting a greater tendency toward wild guessing than older children. Correlations with Perceptual Inference performance were summarized by Westcott as follows:

> ...the youngest subjects with low Mean Right scores tended to be adult oriented, fantasy oriented, and highly verbal girls. In grades five and six, the subjects with the best Mean Right scores tended to be subjects of both sexes who are more intelligent and particularly good on the Performance sub-scale of the WISC. On the one-response form of the Perceptual Inference task, mathematical achievement and general intelligence tend to be related to both high Information Demand and high Success in grades one to four, while in college females, mathematical aptitude tends to be associated with high Information Demand, but not necessarily with high Success.(8, p. 174).

Frick(13) replicated some of Westcott's studies, using the Westcott Perceptual Inference Scale, but limiting the administration of it to the multiple-response method. He also derived two additional measures, namely, Total Attempts and Viewing Time. The results confirmed the findings of Westcott's investigations.

Intuitive thinking was found to be only slightly or not at all related to measures of intelligence and achievement; neither was the amount of time spent viewing each stimulus clue associated with the subject's performance on the inference scale. However, the Total Attempts scores revealed a marked unwillingness by the subjects to make an attempt to infer the correct solution on the basis of little information.

The number of cases was too small for Frick to include race as a variable, but by simple head count he was able to determine that black subjects were more willing to make inferences from little information than white subjects; they were also superior to white students in correctly identifying the picture on the basis of incomplete information.

The possibility of an association between intuition and creativity has been considered by various writers. Establishing such an association is complicated by the fact that "creativity" is a term as slippery as "intuition." MacKinnon(14) decided that creative people differed sufficiently so that they could not be expected to fit a given mold . Stephenson and Treadwell(15) experimented with an adult creativity training program. They found inhibitions to creativity in the personalities of the subjects as well as in the job requirements. Hence

personality correlates of creativity must be considered in the light of given situations. Yet neither Hallman(16) nor Simon(17) gave weight to situational requirements for creativity. They both, however, regarded tolerance of ambiguity as a necessary condition for creativity.

Guilford(18) developed a theoretical model for the complete structure of the intellect. Creative thinking is not allocated exclusively to any particular portion of the model. The same thing is true of problem solving. "The different intellectual abilities needed to cope with problems may also be as varied as the factors in the structure of intellect"(18, p. 11).

Razik(19) reports that tests used in research studies on creativity emphasize divergent thinking. Since traditional measures of intelligence emphasize convergent thinking, the relationship between creativity and intelligence remains obscure.

Covington(20) reported studies investigating productive thinking. Creative thinking and understanding were found to be vital elements. In connection with reading, Covington listed three cognitive skills: (1) ability to draw inferences, (2) sensitivity to factual discrepancies, and (3) propensity for question asking. These cognitive skills can be trained and enhanced by systematic practice in creative thinking. Experimental evidence shows that

creativity in reading and problem solving is significantly associated with higher order cognitive processes. Covington found also that personality factors are important to creative problem solving. He listed questioning, tolerance for ambiguity, self-confidence, and a recognition of the value of creativity(21).

The only experimental evidence relating creativity and intuition that has come to this writer's attention is that of Westcott. He correlated Mean Right scores on the Perceptual Inference Scale with teacher ratings of creativity. In a public school sample the correlation was significantly positive at a point in time, but not so with the same sample two years later. In an independent school sample the correlation was significantly positive both at a given point in time and also two years later. Westcott did not comment on the results other than to describe them as "provocative." (8, pp. 175-6)

CHAPTER III

PROCEDURES

The problem of this study was investigated on the basis of the following hypotheses:

1. That willingness to make inferences based on little information is a variable distributed in the form of a curve positively skewed in the direction of more frequent attempts.

2. That accuracy of inferences based on little information is a variable distributed in the form of a symmetrical curve.

3. That willingness to make inferences based on little information is a variable found more frequently among

(a) black subjects than white subjects.

(b) lower class subjects than higher class subjects.

4. That the propensity to carry on intuitive thinking is a variable found more frequently among

(a) black subjects than white subjects.

(b) lower class subjects than higher class subjects.

The Instrument. The instrument used was an incomplete pictures test. Such a test has been used to measure recognition threshold in an extensive examination of perception(22) and also as part of an investigation of

anxiety and tolerance of ambiguity(23). Westcott(8) and Frick(13) used the technique of incomplete pictures to measure perceptual inference.

The scale used in this study consisted of pictures selected from children's coloring books and drawn on 5" x 8" white cards. Each picture appeared in varying degrees of completeness through eight cards. The first card had only a few scattered lines. Each succeeding card repeated those lines and added a few more so that the picture "grew" to completion on the eighth card. These cards served as visual clues designed to stimulate the subject to attempt an identification of the object represented by the completed picture. Twelve sets of pictures constituted the total scale.

The subject was permitted to view each clue without time limit and to make as many attempts as he wished to identify the object at any stage in the sequence. This procedure yielded two scores: (1) the Total Attempts score, which was simply the cumulative total of a subject's attempts to identify the twelve objects, and (2) the Right score, which was the point at which the correct identification was made. Westcott established the reliability for a Mean Right score from the results of six samples. Correlations ranged from .35 to .83, with four samples in the .60's(8, p. 159).

The Subjects. The subjects were 140 fifth graders from six schools in the Atlanta Public School System. Three of

the schools -- Capitol Avenue, Grant Park, and Cook -- were identified as being disadvantaged on the basis of their eligibility for Title I funds from the ESEA, which indicates that at least sixty per cent of the parents have an annual income under $3000. The other three schools -- Goldsmith, White, and Garden Hills -- were identified as being advantaged in view of their ineligibility for Title I funds.

Testing Procedure. The incomplete pictures test was administered in one classroom of each of the six schools. All subjects were first given group instructions during which they were made acquainted with the procedure to be followed and permitted to practice with a sample set of incomplete pictures. Each subject was then tested individually in a room provided for that purpose.

Examiner and subject sat at a table across from each other. On the table stood a brief case behind which were concealed the stacks of 5 x 8 inch white cards containing the visual clues. These clue cards were numbered from 1 to 8 and previously arranged so that they could be picked up consecutively. The stacks of eight cards were arranged for easy manipulation. The order of presentation of each of the twelve sets of clue cards remained the same for each subject and was obtained by means of a table of random numbers.

The examiner began each interview by reviewing the procedure to be followed and making sure that the subject

understood. The examiner then exposed the first clue card to the subject, who either attempted to identify the picture or indicated that he was unable to do so. In the latter case the examiner laid the clue card upon the table and exposed the second card. This procedure was continued until correct identification by the subject. In case the subject responded incorrectly, he was permitted to continue viewing the clue card and to make as many attempts as he wished to identify the picture correctly. A new clue card was not exposed unless and until the subject indicated a need for it. All subjects were able to identify every picture within the eight clues.

A tape recorder was used to record every interview. After all interviews were completed, the tapes were played and the required data entered on a sheet provided for each subject. This data sheet contained a cell for each clue card for each picture. The playback of the tapes indicated what attempts the subject had made and at which clue he had made them.

CHAPTER IV

ANALYSIS OF THE DATA

Method of analysis. Westcott(8) obtained a Mean Right score from his Perceptual Inference Scale which was simply a subject's average Right score for the total number of pictures in the scale. Frick(13) decided to first investigate the possible difference in level of difficulty among the pictures of the scale. He found the mean of the Right scores of all the subjects for each picture. Since the means varied considerably, Frick decided to use the mean for each picture as the level of difficulty and compare each subject's score with the mean for all subjects. This latter procedure was used in this study.

In the analysis of the results of this study, therefore, each subject's Right score is not his mean score for twelve pictures, but the number of pictures for which his Right score was at or above the mean for all subjects for that picture. Thus if a subject was above the group mean on 3 pictures and below on 9, his Right score was 3; if he was above the mean on 6 pictures, at the mean on 2, and below on 4, his Right score would be 8. Right scores, then, are the number of pictures for which a subject was at or above the mean for all subjects with respect to the number of clues needed to correctly identify the picture.

Total Attempts scores are used as a measure of the willingness of a subject to make an inference on the basis of little information or at least incomplete information. In this case, the score is simply the number of attempts a subject made to identify a picture, summed over the twelve pictures.

Results of analysis. The results of analyzing the data will be presented in terms of the four hypotheses of the study.

Hypothesis 1 stated that willingness to make inferences based on little information is a variable distributed in the form of a curve positively skewed in the direction of more frequent attempts. As indicated above, willingness is measured in terms of the Total Attempts score. Figure 1 represents the distribution of these scores for the total sample. The curve is quite obviously positively skewed. Two fifths of the subjects made a total of fewer than twenty attempts to identify twelve pictures. If one remembers that one attempt was required for the correct identification, then these fifty six subjects averaged less than one attempt in addition to the correct one. Furthermore, ninety four subjects, or two thirds of the total sample, made fewer than thirty attempts to identify the twelve pictures. Again, eliminating from consideration the attempt necessary for correct identification, two thirds of all subjects averaged slightly more than one attempt to identify each picture.

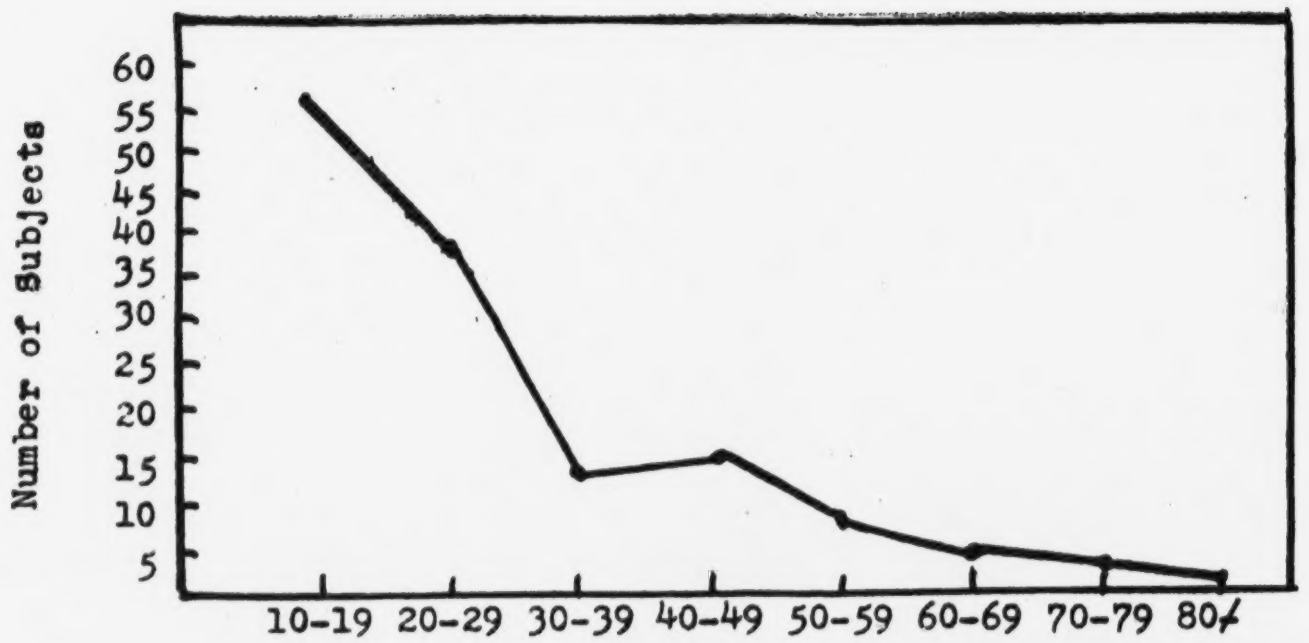

FIGURE 1

DISTRIBUTION OF SCORES FOR TOTAL ATTEMPTS

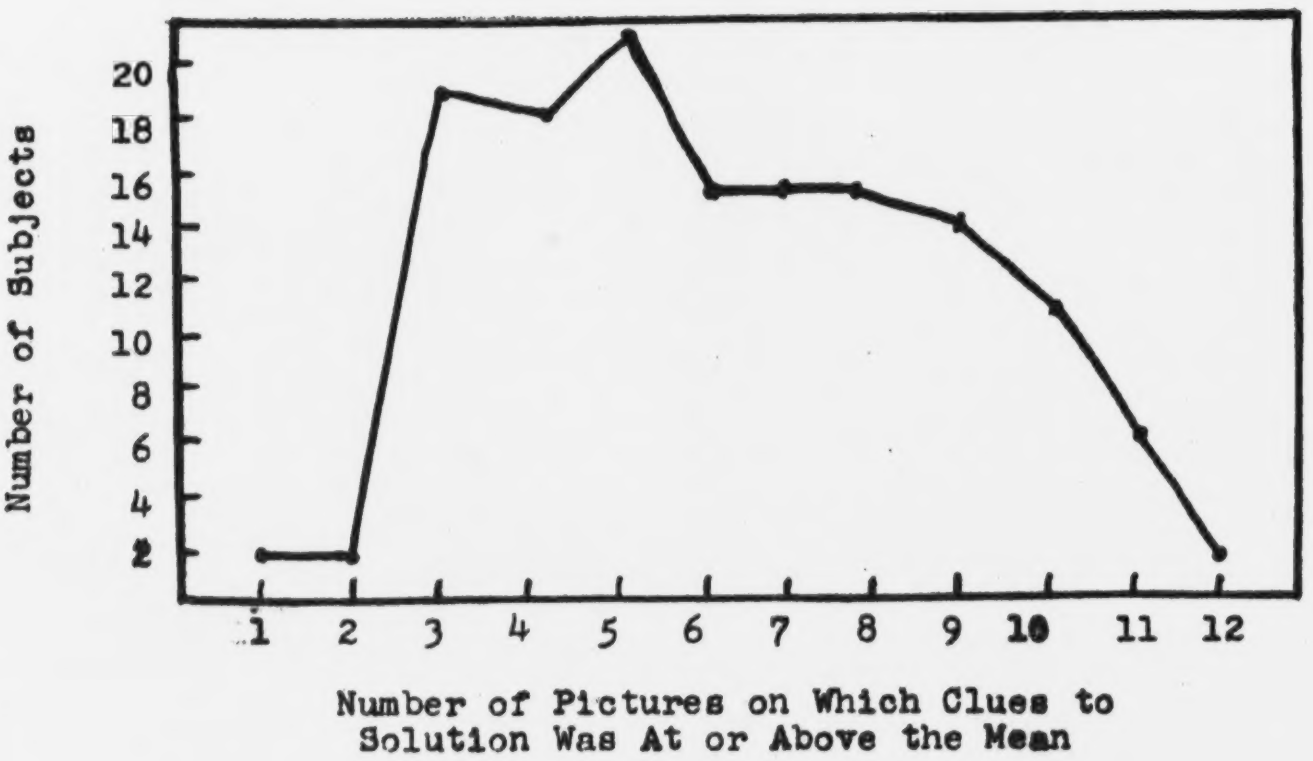

FIGURE 2

DISTRIBUTION OF SCORES FOR CLUES TO SOLUTION

Observation of the data in Figure 1 indicates that Hypothesis 1 must be retained.

Hypothesis 2 stated that accuracy of inferences based on little information is a variable distributed in the form of a symmetrical curve. "Little information" or "incomplete information" was established on the basis of group consensus as represented by the mean number of clues required by the total sample to identify a given picture. It will be remembered that the Right score is the <u>number of pictures</u> for which a subject was at or above the group mean with respect to the number of clues needed to correctly identify the object. A low Right score indicates that a subject was at or above the group mean on few pictures; therefore, on most of the pictures, this subject required fewer clues to identify the object than did most of the other subjects. A subject with a low Right score meets the requirements for intuitive thinking as defined in this study.

The curve representing the distribution of Right scores in Figure 2 shows a certain amount of symmetry. The rising segment of the curve is somewhat erratic, but the over-all shape is symmetrical enough to that by observation of the data in Figure 2 one need not compute the moment of skewness to determine that Hypothesis 2 should be retained.

Hypothesis 3 asserted that willingness to make inferences based on little information is a variable found more frequently among(a) black subjects than white subjects and (b) lower class subjects than higher class subjects. It was decided to test this hypothesis by using a two-way analysis of variance table. Since the original sample of 155 subjects contained unequal numbers in the cells of the ANOVA table, some scores had to be eliminated from consideration. A table of random numbers was used to select the scores to be deleted and reduce the size of the total sample to 140 with 35 in each cell.

Table I contains the summary data from the analysis of variance computation. Race is shown to be a significant variable in the determination of a subject's willingness to make inferences from incomplete information. The difference is shown graphically in Figures 3 and 4. Although these figures support the conclusion observed in the consideration of Hypothesis 1, namely, that in general, all subjects, black and white, demonstrated an unwillingness to attempt solutions on the basis of little information, this unwillingness was significantly greater among white subjects.

Table I also reveals that while economic class is not a statistically significant variable, the F ratio is large enough for one to be cautious about conclusions drawn. Figures 5 and 6 are a graphic presentation of the

TABLE I

COMPUTED F RATIOS FOR RELATIONSHIP BETWEEN TOTAL ATTEMPTS AND RACE AND ECONOMIC CLASS

Source	SS	df	ms	F
BETWEEN	3829.9	3		
Economic Class	1108.8	1	1108.8	3.48
Race	2337.3	1	2337.3	7.33*
Race x Economic Class	383.8	1	383.8	1.20
WITHIN	43386.0	136	319.0	
TOTAL	47215.9	139		

*Significant at .01

TABLE II

COMPUTED F RATIOS FOR RELATIONSHIP BETWEEN CLUES TO SOLUTION AND RACE AND ECONOMIC CLASS

Source	SS	df	ms	F
BETWEEN	39.8	3		
Economic Class	20.0	1	20.0	3.03
Race	18.0	1	18.0	2.73
Race Economic Class	1.8	1	1.8	.27
WITHIN	893.2	136	6.6	
TOTAL	933.0	139		

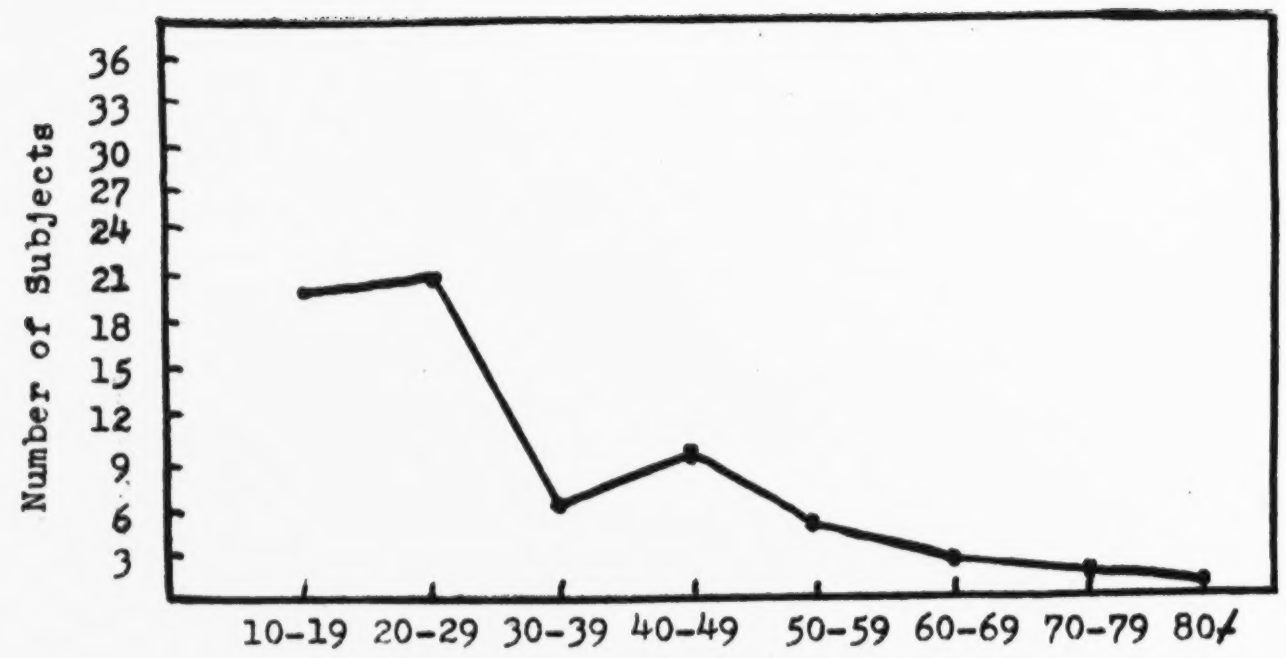

FIGURE 3

DISTRIBUTION FOR TOTAL ATTEMPTS BY BLACK SUBJECTS

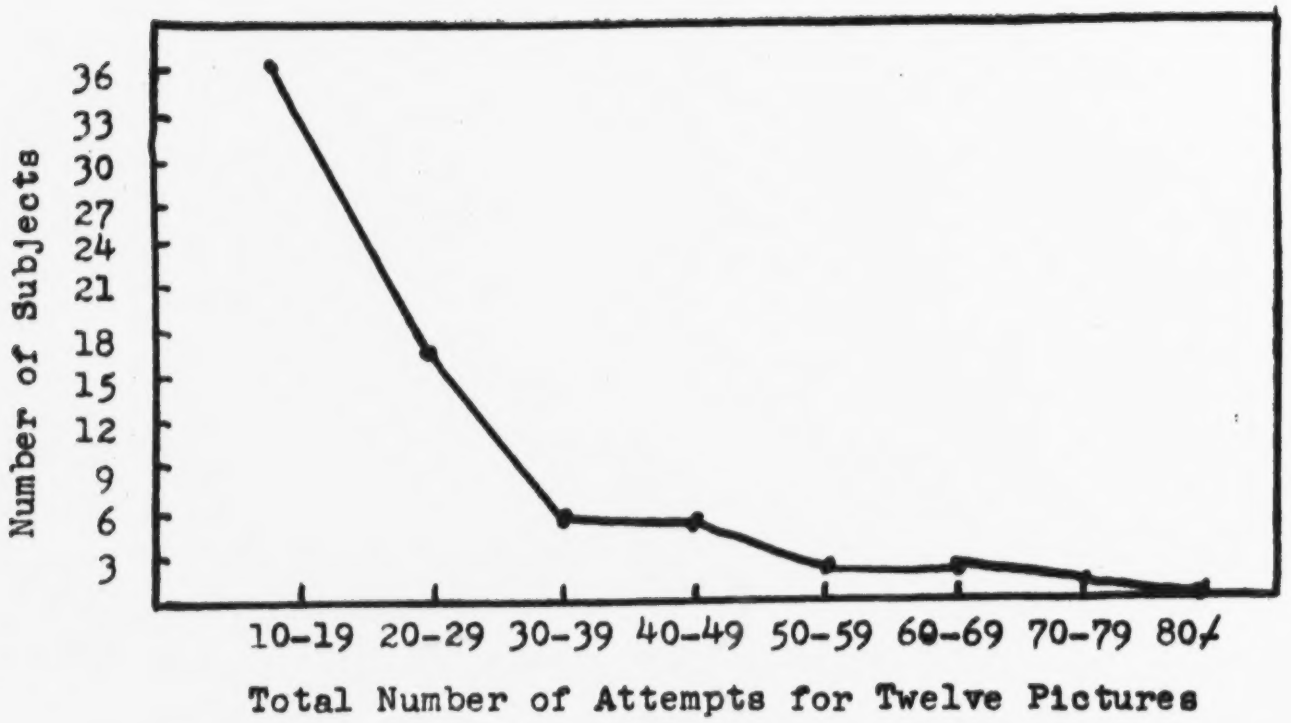

FIGURE 4

DISTRIBUTION FOR TOTAL ATTEMPTS BY WHITE SUBJECTS

comparison between advantaged and disadvantaged subjects with respect to willingness to make guesses under informationally deprived conditions. Disadvantaged subjects tend to make more attempts than advantaged subjects, but, as stated above, the difference is not statistically significant.

Data from the analysis of variance computation indicate that Hypothesis 3a must be retained, while 3b must be rejected; rejected, however, with some degree of caution.

Hypothesis 4 stated that the propensity to carry on intuitive thinking is a variable found more frequently among (a) black subjects than white subjects and (b) lower class subjects than higher class subjects. This propensity was determined on the basis of a subject's Right score -- the lower the Right score the greater a subject's tendency to reach accurate conclusions on the basis of little information. A two-way analysis of variance table was used to determine whether either race or economic class was a significant variable in the achievement of a subject's Right score. Table II(p. 22) contains the summary table from the ANOVA computations.

None of the F ratios are significant, although the two representing race and economic class could be considered at least provocative. Figures 7, 8, 9, and 10 represent graphically the comparisons involved.

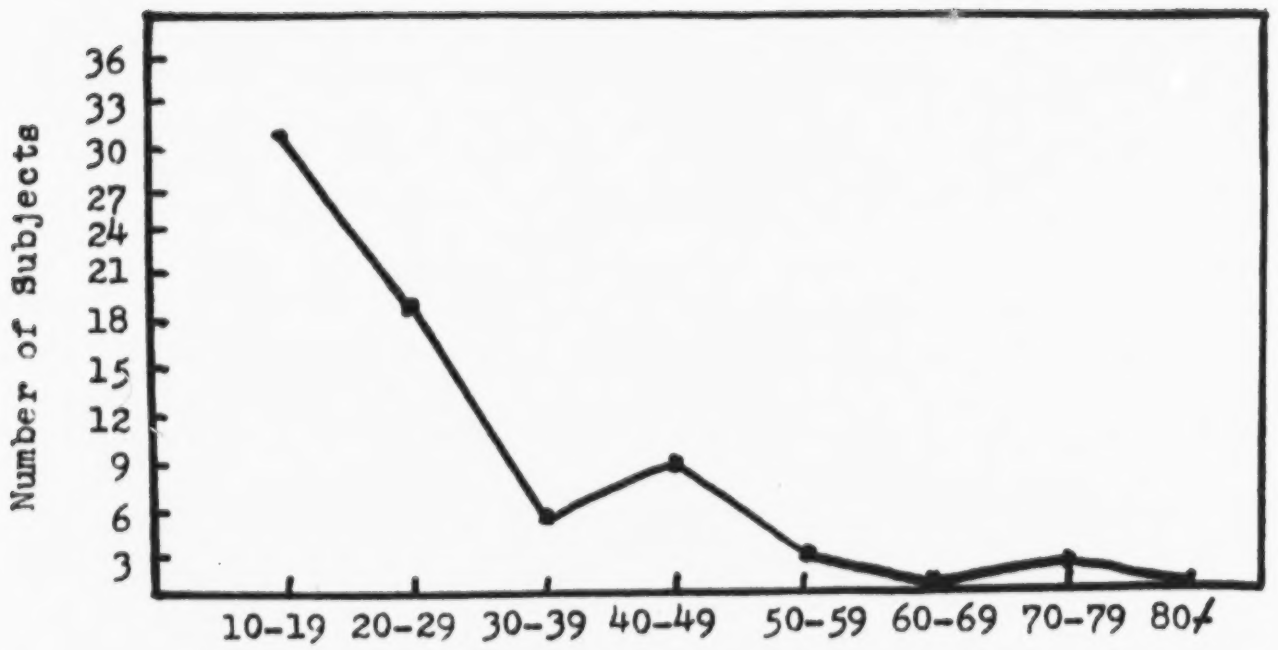

FIGURE 5

DISTRIBUTION FOR TOTAL ATTEMPTS BY ADVANTAGED SUBJECTS

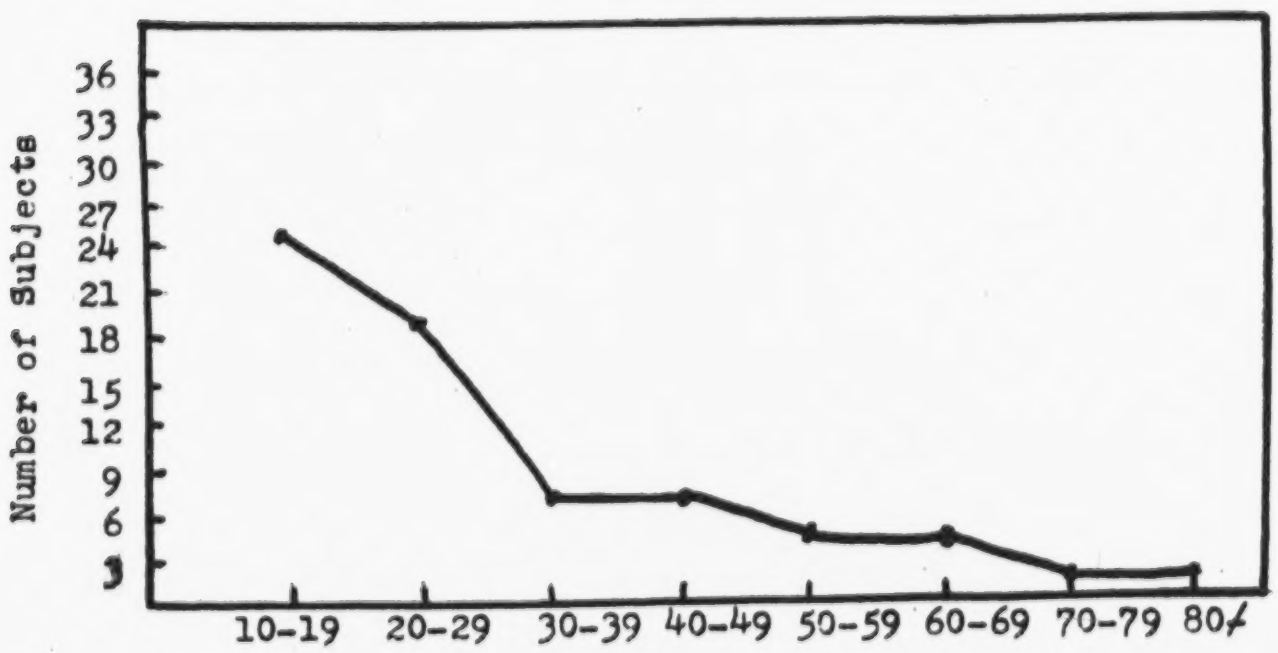

FIGURE 6

DISTRIBUTION FOR TOTAL ATTEMPTS BY DISADVANTAGED SUBJECTS

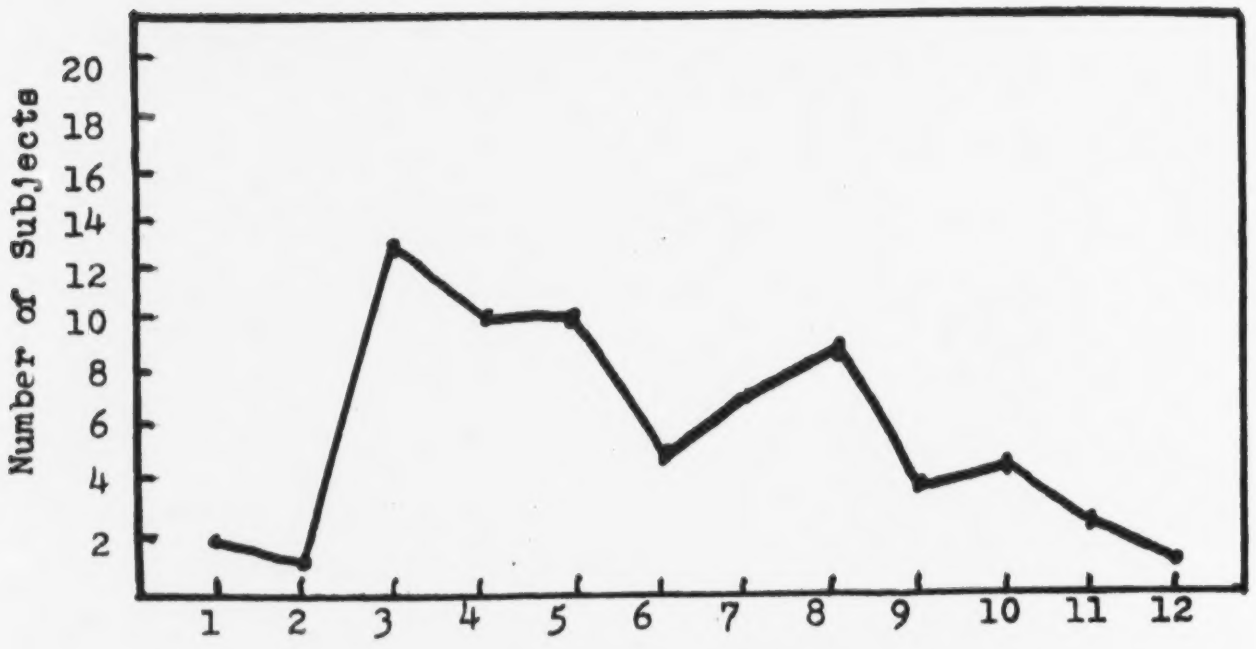

FIGURE 7

DISTRIBUTION FOR CLUES TO SOLUTION BY BLACK SUBJECTS

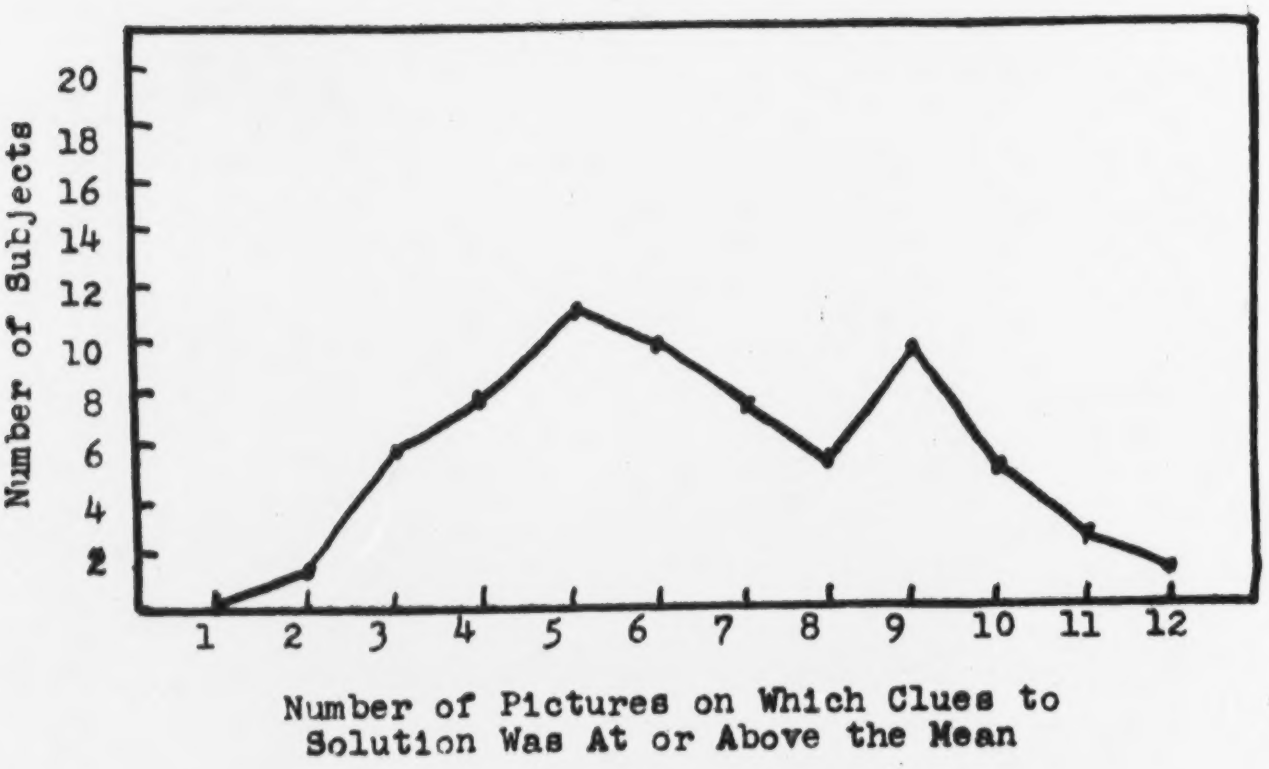

FIGURE 8

DISTRIBUTION OF CLUES TO SOLUTION FOR WHITE SUBJECTS

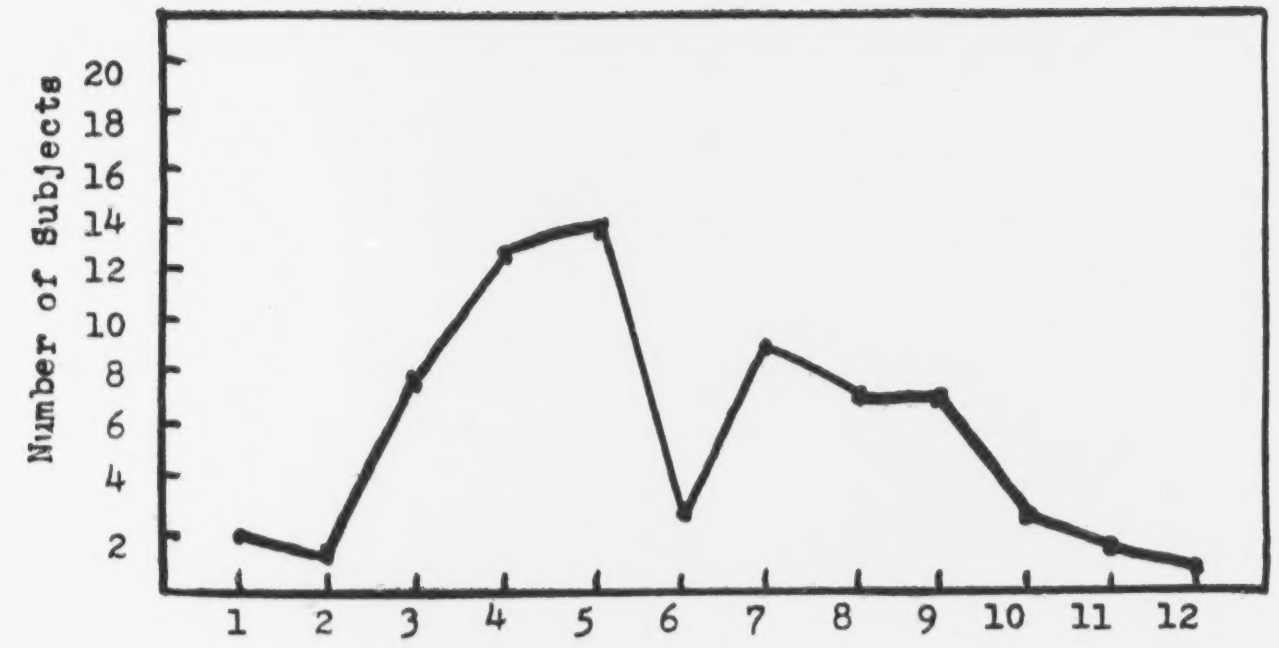

FIGURE 9

DISTRIBUTION OF CLUES TO SOLUTION FOR ADVANTAGED SUBJECTS

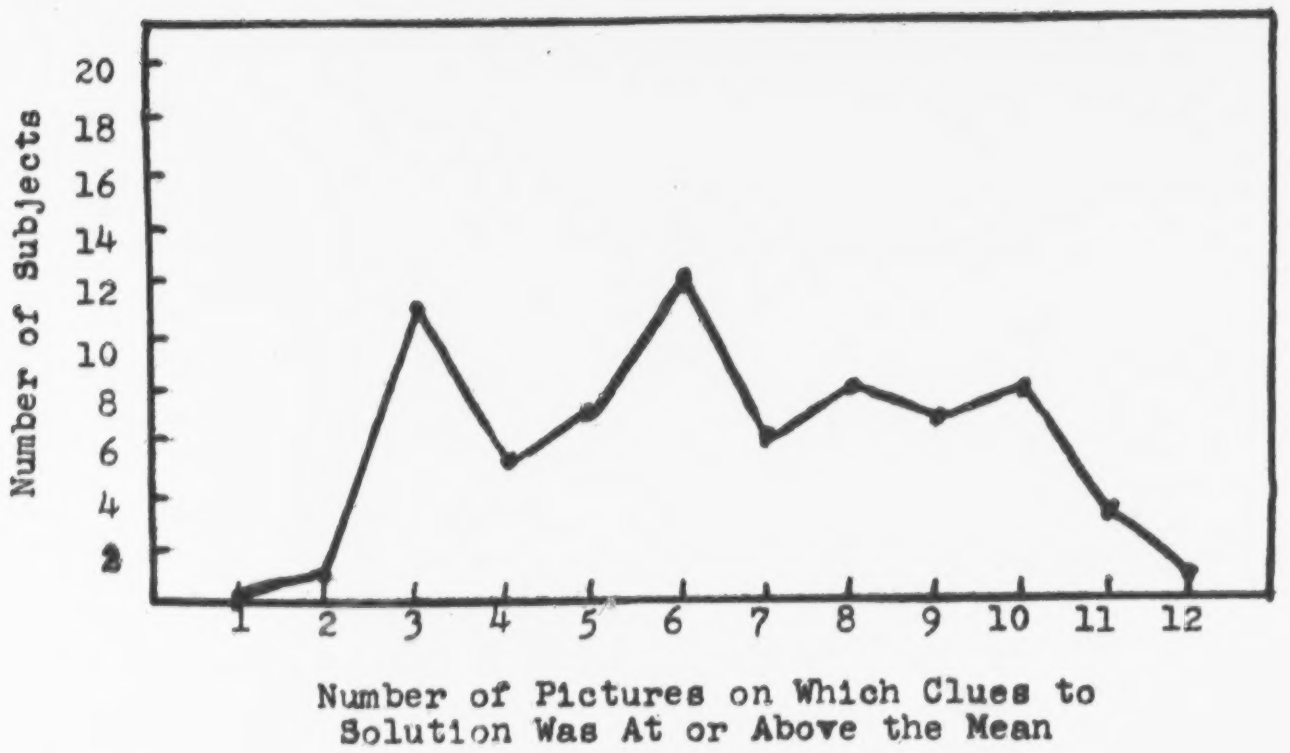

FIGURE 10

DISTRIBUTION OF CLUES TO SOLUTION FOR DISADVANTAGED SUBJECTS

Hypothesis 4a must be rejected by reason of the analysis of the data. Hypothesis 4b must also be rejected. The propensity for intuitive thinking was found more frequently among advantaged than disadvantaged students, although this difference was not significant. Furthermore, mean Right scores suggest that the difference may be more closely related to race than to economic class. This implication will be discussed later. The only procedure warranted by the data is the rejection of Hypothesis 4b.

CHAPTER V

CONCLUSIONS, IMPLICATIONS, RECOMMENDATIONS

The problem in this study was threefold: (1) To investigate the degree of variation in the willingness to make inferences based on little information; (2) to investigate the variation in accuracy of such inferences; (3) to investigate the possible relationship between willingness and accuracy of inferences and the race and socioeconomic class of the subject. The three phases of this problem were studied on the basis of the following hypotheses:

1. That willingness to make inferences based on little information is a variable distributed in the form of a curve positively skewed in the direction of more frequent attempts.

2. That accuracy of inferences based on little information is a variable distributed in the form of a symmetrical curve.

3. That willingness to make inferences based on little information is a variable found more frequently among

   (a) black subjects than white subjects.

   (b) lower class subjects than higher class subjects.

4. That the propensity to carry on intuitive thinking

is a variable found more frequently among

(a) black subjects than white subjects.

(b) lower class subjects than higher class subjects.

Conclusions. On the basis of results obtained from observation of the distribution of scores and from a two-way analysis of variance, the following conclusions were drawn:

1. Subjects demonstrated a marked unwillingness to make inferences based on little information.

2. Propensity for intuitive thinking as measured by accuracy of inferences based on little information appeared to be fairly normally distributed among the subjects in the sample, since the curve representing this distribution was symmetrical.

3. While subjects generally were unwilling to attempt inferences on the basis of incomplete information, this unwillingness was significantly greater among white subjects than black subjects; it was also greater among advantaged than disadvantaged subjects, but this difference was not significant.

4. The propensity to carry on intuitive thinking -- that is, to reach accurate conclusions under conditions of information deprivation -- was mathematically greater among black subjects than white subjects and among advantaged subjects than disadvantaged subjects, but none of the differences were statistically significant.

Implications. The manner in which Hypothesis 1 was stated, that is, the direction it took, indicates that the unwillingness exhibited by the subjects of the study was expected. One has no difficulty in recruiting others to agree with this expectation(10, 12, 24). It is possible that most individuals connected with the educational enterprise are aware that students of all age levels have a fear of failure. This fear, coupled with and sometimes resulting from the systematic repression of any kind of guessing behavior in most classrooms, has helped to create and develop in students the avoidance of attempting intuitive hunches even when they are appropriate.

But perhaps very few educators realize how nearly total this avoidance really is. The average number of picture clues viewed by each subject was about 4.5. With unlimited time to view each picture, therefore, the subjects looked at more than four pictures and made a total of what averaged to a little more than one attempt to identify the object before reaching the correct solution. This is based on the fact that the average number of attempts per picture per subject was about 2.4. Thus if one of those attempts was used for the correct identification, it leaves an average of 1.4 attempts at a solution during the course of viewing 4 pictures. Black subjects averaged about two attempts in addition to the correct one, white subjects one attempt in addition to the correct one. Most subjects took very little time to look at the stimulus clue. At

first exposure of the clue, if subjects did not recognize it immediately, they tended to ask promptly for the next clue. Usually there was no indication by the subject that he considered the intuitive hunch or creative guess as acceptable and appropriate procedure.

It is interesting to note that the earlier study by Frick(13) produced virtually the same results, except that the mean number of attempts was lower -- a condition that, in the light of this study, may have resulted from the small number of black subjects in the first study. The evidence of these two projects appears to support Holt(24) and others who maintain that the years of punishing children for being wrong have exacted a grim toll.

Since the data resulting from the scores measuring accuracy of intuitive hunches are less dramatic, implications must be considered with some caution. None of the differences were statistically significant, but they were nevertheless interesting. The F value representing differences in favor of advantaged over disadvantaged subjects was larger than that favoring black over white subjects. However, the mean score for white advantaged subjects was exactly the same as that for black disadvantaged subjects. The different performance by subjects of differing classes lay in the greater tendency toward intuitive behavior by the black advantaged students, and the lesser tendency by the white disadvantaged students. Since none of the differences

were significant, however, they are probably due purely to chance, and the most logical implication is continued investigation.

Intuitive performance by the subjects in this study was generally not very successful. It has already been pointed out that part of the reason may be that such behavior is generally not encouraged in school classrooms. Westcott(8, p. 191) suggests that another reason may be the fact that in our culture we have gotten used to operating under conditions of redundance of information; that deprivation of information exists only at the frontiers of knowledge, as for example, in the scientific laboratory. Implications of this study appear to give legitimacy to intuitive thinking in at least one and probably two kinds of school situations.

First, not every school serves pupils whose culture is characterized by redundance of information. Many communities populated by black and/or poor people are restricted because of a severe deprivation of knowledge, especially of the kind that is requisite for school success. It would appear that in such schools, the encouragement of intuitive hunches or guesses ought to be a useful teaching strategy. The results of this study imply that black children, and possibly poor children, are already more willing than others to attempt to operate under informationally deprived conditions.

Secondly, it is in order to consider frontiers of knowledge that exist in the classroom. Success in reaching solutions on the basis of incomplete information may be within the grasp of more students than is commonly supposed. Such students are operating on the frontiers of knowledge when they creatively identify, define, and attempt to solve problems. The results of this study imply the encouragement of such students and exploitation of such procedures.

Recommendations.

1. Teachers of disadvantaged students, especially black disadvantaged students, ought to consider what appears to be a greater than average willingness to operate under conditions of little information. The word "disadvantaged" is apparently becoming obsolete, but whatever term is used to identify these children, they are frequently characterized by a deprivation of the kind of information that is associated with success in school. Educators who specialize in early childhood education among informationally deprived children ought to include for these little people emphasis on the importance of an environment of psychological freedom and safety so that playing a hunch or making a guess is given legitimacy as an educational strategem. This emphasis should, of course, be encouraged among teachers of older children as well, but the earlier it is begun, the better.

2. Teachers of all children, but again, especially teachers of those living under conditions that have resulted in a less-than-desirable fund of information, ought to be alert for the intuitive thinker. He is apparently in the minority and likely to be operating in unconventional and probably unacceptable ways. Unfortunately, there is no reliable way to identify him, but by establishing the kind of climate suggested in the first recommendation and by working with individual children, always looking for the student who makes an unusually large number of successful guesses, it is possible that through acceptance and encouragement of such behavior, a teacher may reclaim some who are otherwise destined for educational oblivion.

3. The findings of Westcott(8) and Frick(13) suggest that an incomplete pictures test is not an effective instrument to measure intuitive thinking. Research is needed to develop instruments that will be more successful in identifying the intuitive thinker.

4. Research is also needed to learn more about the conditions under which intuition operates. Perhaps an individual loses his willingness as well as his propensity for intuitive thinking as he responds to an environment characterized by redundance of informational stimuli.

5. Finally, additional research ought to be conducted to attempt to determine whether intuition is a single, somewhat complete cognitive function or whether it is a

step in the whole creative process. The answer to this question has implications for those who emphasize independence, creativity, and problem solving as major components of the educational endeavor.

Continued studies of intuition are warranted to attempt to reveal its potential for problem solving, for conventional thinking, and for ordinary living. Meanwhile, teachers should capitalize on what is known about intuition to increase the effectiveness of present educational procedures.

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